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Freight and Logistics E-News November 2011 (Vol. 9, No. 2)

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15th annual Freight and Logistics Symposium scheduled for Dec. 2

The Future is Front and Center: The Impacts of Economic Change on Freight Transportation

Critical analysis of the driving forces behind high-impact changes in the freight transportation, logistics, and manufacturing industries is needed to determine national, multistate, state, and regional freight policy and system investment priorities. At this year's symposium on December 2 at the Ramada Plaza Minneapolis, representatives from the business community, academia, and the public sector will consider major trends and the effect of possible economic changes on freight and logistics providers. Christopher Caplice, executive director of the Center for Transportation and Logistics at the Massachusetts Institute of Technology, will make the keynote presentation on economic changes driving future freight transportation.

Register online or visit the event web page for more information. You may also contact Shawn Haag, 612-625-5608, haag0025@umn.edu.

Study analyzes factors that predict crash risk for truckers

Serious crashes involving heavy vehicles are normally rare and therefore hard to analyze statistically. Researchers at the University of Minnesota Morris and Twin Cities campuses, in a multi-year effort, have been studying a large group of new drivers in cooperation with the trucking company that employs them to understand what factors might cause a higher than average risk of crashes. Stephen Burks, associate professor of economics and management at the University of Minnesota Morris (UMM) and the organizer of the work, shared highlights at the 22nd Annual CTS Transportation Research Conference in May.

The study's focus is on new-to-the-industry trainee drivers, trained by and working for a major truckload carrier. Long-distance truckload drivers are the largest single industry group of tractor-trailer drivers. Due to high turnover in this segment, such trainees are always a large proportion of the total trucking workforce.

In the study, the researchers collected measures of cognitive skill, measures of economic preferences, a personality profile (from which the researchers extracted "big five" personality characteristics), and a demographic profile of 1,065 trainee truckers. They then followed the 950 drivers who completed training and began work, collecting the number of miles and trip segments driven each week, the type of work (e.g., random runs versus runs dedicated to a single customer), and crashes. The firm provided information on even very slight crashes (e.g., breaking a rear-view mirror), which are of higher incidence, and also categorized them according to potential (as opposed to actual) severity, which also increased the incidence.

The researchers were able to show that having a crash of the lowest potential severity—which has a relatively high frequency—is predictive of having one that is more potentially serious. Using these data, they explored the relative power of their measures of differences in exposure and differences in individual driver characteristics to predict crash occurrence among their sample.

Several specific exposure differences and some personality and demographic characteristics emerge as the strongest predictors, Burks said. As to exposure, drivers dedicated to a single customer or driving in a team had

fewer crashes than those making more random runs or operating alone. As to individual characteristics, it turned out that differences in cognitive skills had no effect, but the inhibitive side of the personality factor "Conscientiousness" was a strong predictor of fewer accidents. Age had a moderate effect, and body mass index had a large one. The researchers speculate that the higher crash rate for those who are severely overweight might be related to sleep apnea and sleep deprivation—but it could also be from other causes, and research into this question is continuing.

Co-authors with Burks were Jon Anderson, professor of mathematics, and Manjari Govada, student researcher, UMM; and from the Twin Cities, Aldo Rustichini, professor of economics, and Colin DeYoung, assistant professor of psychology.

Support for the work comes from the cooperating motor carrier, the McArthur Foundation, the Sloan Foundation Industry Studies Program, the Trucking Industry Program at the Georgia Institute of Technology, and UMM.

Related resources:

- Truckers & Turnover Project website
- U of M study of truckers finds those with higher IQs make wiser economic choices (*Freight and Logistics E-News*, November 2009)
- Study examines high driver turnover in $96 billion trucking industry (*Freight and Logistics E-News*, November 2007)

Computer vision system for truck stop parking receives FHWA grant

The Federal Highway Administration (FHWA) selected the Minnesota Department of Transportation (MnDOT) to receive $2 million for a University of Minnesota research project designed to use intelligent transportation systems (ITS) technology to give truck drivers real-time information about parking availability at highway truck stops.

The University research team includes lead investigator Nikolaos Papanikolopoulos, professor in the Department of Computer Science and Engineering (CSE); Vassilios Morellas, program director with CSE; Max Donath, director of the ITS Institute; Panos Michalopoulos, professor in the Department of Civil Engineering; and Ted Morris, lab manager of the Institute's Minnesota Traffic Observatory.

The project is being directed by John Tompkins, Mn/DOT manager of freight planning and development. The American Transportation Research Institute (ATRI), part of the American Trucking Associations Federation, is also a partner. Dan Murray, ATRI vice president, will be the liaison to the research team. The results of the study are expected to be of interest to the public and private sectors.

The funding is provided through the FHWA's Truck Parking Facilities Discretionary Grants Program. The program helps improve safety on the nation's interstates by promoting projects that allow trucks to park safely and securely in areas away from moving traffic, instead of alongside the road itself or on ramps.

Although only 53 percent of parking spaces at truck stops are occupied on any given night, 90 percent of truck drivers perceive a shortage of parking. Drivers unable to locate empty spaces may become fatigued, which is thought to be a contributing factor in a number of crashes.

The new project will implement and deploy findings from ITS Institute-funded research recently completed by Papanikolopoulos and Morellas. In that work, the researchers developed an automated parking space identification system that can compute occupancy at stops. This information could then be used to notify drivers about the availability of parking spots using variable message displays miles ahead of stops.

Related resources:

- 2009 ITS Institute Annual Report story: "Counting Empty Parking Spots at Truck Stops"
- Counting Empty Parking Spots at Truck Stops research project page

Research explores benefits of distance-based fees for trucking industry


Ferrol Robinson

Ferrol Robinson, a research fellow with the Humphrey School of Public Affairs, outlined an active research project exploring the benefits of distance-based fees for the trucking industry during a session on the freight system at the 22nd Annual CTS Transportation Research Conference in May.

According to Robinson, funding the U.S. surface transportation system with a fuel tax is no longer sustainable, so alternatives such as mileage-based pricing are being considered. For the third year in a row, the Federal Highway Trust Fund has required supplemental infusions from the General Fund to keep it solvent—a situation likely to continue. He attributed insufficient fuel tax revenue to an increase in more fuel-efficient vehicles, the use of alternative fuels, and a decline in purchasing power due to inflation.

Distance-based pricing—in which drivers pay a fee for each mile traveled rather than a tax on each gallon of fuel purchased—can be set to vary with factors such as weight, time of day, emissions, and fuel efficiency. The underlying pricing principle is that the users pay for use of the road and for the impact they cause.

"We have known for years that heavy trucks do cause more damage. A lot of cars cause less damage, but they still put the mileage on the roads," Robinson said. "So we need them to pay a fair amount for their use."

He emphasized that fully implementing distance-based pricing would take a decade or more. In the interim, fuel taxes would continue.

Robinson addressed several industry objections to changes in the way the transportation system is funded. Much of

the resistance stems from a common perception by truckers that a new way to pay for roads and bridges could cost them a lot more.

“A number of studies show that a lot of the truck categories pay a lot less than their cost responsibilities. And certainly autos and light trucks pay a lot more than their cost responsibility,” he said. “The bottom line is that the long-term estimated revenue for the trunk highway funds are about $32 billion a year, and the infrastructure financing commission estimated that it’s probably going to take $100 billion per year. So clearly we have problem here.”

Another industry perception is that truckers already have paid for the interstate and don’t need to pay again with new taxes. Robinson observed that, indeed, construction of the interstate 30 to 50 years ago and subsequent maintenance costs have been paid ($129 billion). But the system has aged, he added, and it needs reconstruction (estimated $1.3 to $2.5 trillion).

Though the trucking industry supports a user-fee system—such as the fuel tax—and a fair registration fee based on weight, it does not support a weight-distance tax. “The fuel tax, we find, is not a fair system,” Robinson countered. “It has become unfair because not everybody is paying their responsibility for the costs they influence or impact.”

Robinson added that fuel-efficiency improvements apply to trucks as well as cars and just increasing the fuel tax won’t solve the funding problem. He also discussed the cost of implementing distance-based charges and privacy concerns. To support his case for distance-based pricing, he described Germany’s experience tolling heavy trucks for distance, weight, and emissions on the Autobahn, which he said “pushed truckers to be more efficient.”

Finally, Robinson estimated that transportation accounts for nearly 40 percent of the cost of freight and logistics. “If we can find ways through distance-based pricing to reduce transportation costs,” he concluded, “the industry will benefit.”

Applied economics research assistant David Coyle and associate professor Gerard McCullough, as well as John Hausladen, president of the Minnesota Trucking Association, are contributing to the research.

Related resources:

- Robinson’s 2011 research conference presentation slides (354 KB PDF)
- Benefits of Distance-Based Fees for the Trucking Industry research project page

Portable weigh station for rural roads debuts at MnROAD

In August, the Minnesota Department of Transportation (MnDOT) hosted a demonstration of a portable weigh-in-motion (WIM) system at the MnROAD pavement research facility near Albertville, Minnesota. The system, designed by University of Minnesota–Duluth electrical and computer engineering professor Taek Kwon, promises to make it easier and less expensive to monitor truck traffic, especially in rural areas.

Taek Kwon and the portable weigh station

In recent years, state, county, city, and township transportation authorities have grown more concerned about damage to local roads and bridges due to the increased traffic of larger, heavier trucks. The need for better data about vehicle loads became critical when a new state law in 2009 considered all paved roads to have a 10-ton design unless posted otherwise.

Minnesota has 16 WIM stations, with another scheduled to open near Moorhead next month. All but one are located on a principal arterial route. “There’s a lot of area that we’re not really covering, and a portable weigh-in-motion system would be useful,” said Ben Timerson, weight data and engineering coordinator at MnDOT. “Truckers fairly rapidly figure out where the permanent sites are and learn how to avoid them.”

Timerson, who hosted MnROAD demo, said a portable WIM system would aid the Minnesota State Patrol in weight enforcement, and the additional freight data would be useful for managing the county road system, designing appropriate pavements, and setting bridge load restrictions.

MnROAD demo of the portable weigh station

Kwon’s portable WIM system, developed after testing several configurations, currently comprises two 24-foot-long sensor strips, each about 12 inches wide and connected to a battery-powered computer controller that calculates the vehicle load using software Kwon also created. The heart of the design is a pressure sensor consisting of a thin strip of piezoelectric material, which converts mechanical pressure into a measurable electrical signal. The sensors, which are spaced 10 feet apart and stretch perpendicularly across two lanes of traffic, typically are fastened to the pavement with a few concrete screws and tape.

Kwon said the system is most effective on a smooth, well-maintained paved surface. In addition, the system is intended for use only in dry weather conditions.

Kwon demonstrates the portable weigh station controller.

The research to develop the portable WIM system has been sponsored by MnDOT. In addition, MnDOT State Aid and the Minnesota County Engineers Association have supported the research, with several county engineers serving on the technical advisory panel for the project. Eventually, the plan is to contract with a manufacturer to produce a commercial version of the system.

Related resources:

- Development of a Weigh-Pad Based Portable WIM System project page
- About researcher Taek Kwon

Transportation Club Expo scheduled for Mar. 20, 2012

March 20, 2012 Transportation Club 2012 Expo and Luncheon Ramada Mall of America 2300 East American Blvd. Bloomington, MN 55425

The expo, the largest transportation exhibition in the United States with more than 80 exhibitors, follows the luncheon and is free.

- **Luncheon Cost**: $35 ($40 non-members)
- **Contact**: Transportation Club of Minneapolis and St. Paul (952-239-1226, office@transportationclub.com)

Council of Supply Chain Management Professionals Twin Cities Roundtable events

Please visit the Minnesota Council of Supply Chain Management Professionals Twin Cities Roundtable online for information about upcoming events.

CSCMP Twin Cities Roundtable previous events:

- April 14, 2011 – Tour of Red Wing Shoe Company (1.3 MB PDF)
- November 17, 2011 – CSCMP Twin Cities Roundtable Luncheon: Mapping your Supply Chain

FHWA 'Talking Freight' seminars

Upcoming topics and dates for the "Talking Freight" online seminars from the Federal Highway Administration (FHWA) are listed on the Talking Freight website.

More news and information

Recently published freight-related research from the Transportation Research Board (TRB):

- National Freight Cooperative Research Program (NFCRP) Report 13: *Freight Facility Location Selection: A Guide for Public Officials* (October 2011)
- NCFRP Web-Only Document 1: *Background Research Material for Freight Facility Location Selection: A Guide for Public Officials (NCFRP Report 13)* (October 2011)
- NCFRP Web-Only Document 2: *Multi-State Freight Transportation Organizations* (October 2011)
- Transportation Research Record (2224): *Freight Systems 2011: Modeling and Performance Measures* (October 2011)
- NCFRP Report 11: *Truck Drayage Productivity Guide* (June 2011)
- NCFRP Report 10: *Performance Measures for Freight Transportation* (May 2011)
- National Cooperative Highway Research Program (NCHRP) Synthesis 410: Freight Transportation Surveys (March 2011)
- Commercial Truck and Bus Safety Synthesis Program (CTBSSP) Research Results Digest 8: *A Status Report 2011* (February 2011)
- NCFRP Report 9: *Guidance for Developing a Freight Transportation Data Architecture* (January 2011)
- Electronic Circular E-C146: *Trucking 101: An Industry Primer* (December 2010)
- Transportation Research Record (2168): *Freight Transportation Modeling, Planning, and Logistics* (December 2010)
- NCFRP Report 8: *Freight-Demand Modeling to Support Public-Sector Decision Making* (November 2010)

Comments

We would like to hear what you think of *CTS Freight & Logistics E-News*. Please respond to this message or e-mail us at cts@umn.edu.

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